

### Abstract of the Invention

The present invention provides a MEMS-based integrated particle identification system having a substrate, a magnetic structure, and a bioferrograph. The substrate  
5 includes a topside portion, backside portion and a flow system. The flow system includes a flow channel for accepting the flow of a stream of particles to identified. The magnetic structure is in physical communication with the topside and backside portions of the substrate and has  
10 at least two pole pieces. A plurality of pole piece embodiments are provided for generating a magnetic field that acts on magnetically susceptible particles in the flow stream. The bioferrograph has at least one sensor for identifying the presence and quantity of magnetically  
15 susceptible particles. A plurality of sensor embodiments are also provided.

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